REMARKS / ARGUMENTS

I. General Remarks and Disposition of the Claims

Please consider the application in view of the following remarks. Applicants thank the Examiner for his careful consideration of this application, including the references that Applicants have submitted in this case.

At the time of the Office Action, claims 1, 3-5, 10-14, 21, 24-29, 100-106, 109-127, 130-145, 147, and 149-154 were pending in this application. Claims 1, 3-5, 10-14, 21, 24-29, 100-106, 109-127, 130-145, 147, and 149-154 stand rejected. Claims 1, 4, 106, 127, 131, 147, 150, and 151 have been amended herein. Claims 109, 110, and 152-154 have been canceled. Claims 155-157 are new. These amendments are supported by the specification as filed. Applicants respectfully request that the above amendments be entered and further request reconsideration in light of the amendments and remarks contained herein.

II. Interview Summary

In accordance with 37 C.F.R. § 1.133 and M.P.E.P. § 713.04, Applicants present the following summary of a telephonic interview between the Examiner, John J. Figueroa, and Applicants' Attorney, Corey S. Tumey, Reg. No. 57,079, conducted on March 4, 2008. In the interview, the rejection of independent claims 1, 106, and 127 under 35 U.S.C. § 103(a) were discussed. In particular, U.S. Patent No. 3,271,307 issued to Dickson *et al.* (hereinafter "*Dickson*") and U.S. Patent No. 4,532,052 issued to Weaver *et al.* (hereinafter "*Weaver*") were discussed. Specifically, Applicants' attorney noted that *Dickson* does not disclose all of the elements of claims 1, 106, and 127 and *Weaver* fails to demonstrate a hydrophobically modified water-soluble polymer that reduces the permeability of the subterranean formation to aqueous-based fluids, as required by claims 1, 106, and 127. No specific agreement was reached as to allowable claim language.

III. Remarks Regarding Rejections Under 35 U.S.C. § 103(a)

Claims 1, 3-5, 10-14, 21, 24-29, 100-106, 109-127, 130-145, 147, and 149-153 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Dickson* in view of *Weaver*. With respect to this rejection, the Office Action states:

> Dickson discloses branched polyalkylene polyamines that are additives in aqueous fluid compositions for treatments of subterranean oil formations (particularly in fracturing oil wells by using pressure, *see* col. 43-47), said branched polyalkylene

polyamines having a backbone base polyamine, (or derivative thereof) hydrophilic polymer and alkylene branch that can be, e.g., butylene (4 carbons) or other homologs, straight-chained or branched. (Col. 1, lines 13-50; col. 2, line 16 to col. 3, line 5) These compounds can undergo acylation (to form, e.g., acrylate or methacrylate derivatives); can be reacted with an alkenyl succinic acid derivative (col. 3, lines 50-68; col. 5, lines 8-55; col. 6, lines 43-73); amidification that can provide amino pendant groups (col. 7, line 62 to col. 8, line 24); and/or can undergo alkylation/oxyalkylation (to form, e.g., a polyetheramine that can have a hydrophobic branch having primary, secondary or tertiary amines) with, e.g., an alkylating agent, butylenes oxide or octylene oxide (col. 10, lines 1-16; col. 15, liens 56-66; col. 19, lines 25-59; col. 21, lines 1-23; col. 24, lines 39-53; Table II; Examples 1-3). The alkylating agent can be an alkyl halide, such as n-butyl chloride, n-hexyl iodide or octadecyl bromide, which would provide hydrophobically-branched polyamines having alkyl branches of 4, 6, and 18 carbons, respectively, with no intervening heteroatoms. (Col. 19, lines 25-29).

Dickson also discloses increasing the molecular weights of these branched polyamines through carbonylation, wherein the carbonyl reacts intermolecularly to act as a bridging means between two or more polyamine monomers/compounds, thus increasing the molecular weight of the polyamines. (Col. 29, lines 5-18)

In Example 5 and Table 6, Dickson discloses examples/results from alkylating a polyamine homopolymer to obtain hydrophobically-modified branched polyamines.

Furthermore, Dickson discloses that these branched compounds have numerous uses in processes involving water flooding in a subterranean formation and have several advantages, such as not forming precipitates, good anti-corrosion properties and having strong bactericidal action. (Col. 31, line 72 to col. 32, lines 39) These compounds are stable reagents even in the presence of acids and, thus, can be applied satisfactorily to wells that have been acidized with hydrochloric or hydrofluoric acid. (Col. 41, lines 9-20; col. 50, 52-63).

In columns 37-43, Dickson further discloses examples whereby an aqueous treatment solution, having dispersed therein 5-25% by wt. of the aforementioned compounds, can be injected into a well that has been acidized to remove mud sheath from the interior of the well. These compositions can include surface-active agents (surfactants), although the disclosed polymers themselves can impart detergent/wettability properties to the treatment solution. The well is usually shut down for a few hours following

treatment before production is resumed. (Col. 31, line 72 to col. 32; line 28; col. 37, lines 57-58; col. 38, lines 48-63; col. 41, lines 10-20 and 50-75; Example on col. 42; claims 1-8)

In other examples, Dickson discloses injecting the branched compounds in a treatment solution to fracture the formation. (Column 43-47) Aqueous formation treatment compositions containing these water-soluble branched polymer compounds can further include natural clays, weighting agents, gel-forming viscosifiers and/or stabilizers, which can improve viscosity and gel-forming characteristics. (Col. 38, line 64 to col. 39, line 11)

Although Dickson may not explicitly disclose all the physical properties of the disclosed branched polymer compounds, or compositions comprising thereof, that are recited in the claims (such as regarding permeability properties) because the water-soluble branched polymers/compositions disclosed by Dickson are encompassed by the water-soluble branched polymers/compositions recited in the method of the instant claims, then they must inherently possess the same physical properties, such as stabilizing a subterranean formation.

Dickson does not expressly disclose that the molecular weight of the resultant branched polymers to be about 100,000 to about 10,000,000.

Weaver teaches a method for treating a subterranean formation to substantially alter the fluid flow (permeability) and/or surface characteristics of the formation, said method including injecting into the formation an aqueous composition that can alter the properties of organic/aqueous fluids, said composition containing a branched water-soluble organic polymer containing unit(s), having a high molecular weight of 900 to 50,000,000, that can be hydrophilic, hydrophobic or a combination thereof. (Abstract; col. 5, lines 1-10 and 30-65; col. 6, lines 29-65; col. 7, liens 7-33; col. 9, lines 32-37 and 49-63; col. 20, line 65 to col 21, line 6; col. 21, lines 49-63; col. 38, lines 37-51; col. 39, lines 24-36; *See particularly*, col. 8, lines 41-67; *See also*, Table 6 on col. 53-54 disclosing data of aqueous fluid diverting and water permeability reduction properties for an aqueous fluid containing methoxypolyethylene oxide branched polydimethylaminoethyl methacrylate copolymer, sand, silica flour and bentonite)

Weaver teaches examples of using fluids containing a hydrophilic polymer modified with hydrophobic branches having desired hydrophobic-hydrophilic to treat a subterranean oil formation to alter the surface characteristic of the formation, the fluid flow and/or resistance to flow relative to a particular fluid, wherein the hydrophilic nature of the branched polymer serves as

> an aqueous gelling agent that provides for an increase in fluid viscosity. (col. 5, lines 11-16; col. 6, line 65 to col. 7, line 40; col. 7, line 63 to col. 8, line 21; col. 10, lines 56-59; Table on col. 9-10) In Tables 23-28, Weaver discloses data for examples of treating a well by injecting into the well an aqueous solution containing a hydrophilic polymer with nonionic branches.
>
> Weaver teaches that the water-soluble branched polymer can have, in its backbone chain and/or in its branch chain, one or more heteroatom or groups, such as nitrogen (e.g., polyamine). (Col. 14, lines 17-23 and 52-59) The polymer units in either chain can be -R-X-, wherein R is a C_1 to C_6 alkyl radical and X represents a heteroatom and are preferably capped. (Col. 19, lines 36-65) Particularly, branched polymers containing polyamine and polyether linkages in the branches are preferred for altering fluid flow properties in the formation and are especially effective and stable at temperatures above 177°C. (Col. 13, lines 1-18)
>
> Among the monomers disclosed in Weaver that can be used to form the branched polymer having the desired hydrophilic-hydrophobic property include dimethylaminoethyl methacrylate. (Col. 19, lines 7-10; col. 19, line 66 to col. 20, lines 29; col. 22, liens 47-65)
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> Therefore, it would have been obvious to a person of ordinary skill in the art at the time that the invention was made to use the high-molecular weight branched polyamine compounds as the hydrophobically-modified hydrophilic polyamine injected in the fluid used in Dickson's method of treating a subterranean formation. It would have been obvious for one skilled in the art to do so to attain a more efficient oil treatment method having the ability to control fluid flow properties/surface characteristics of a particular formation surface by using the resultant aqueous fluid (with the high molecular weight branched polyamine), thereby attaining a desired level of surface permeability of the subterranean formation as taught by Weaver.
>
> Thus, the instant claims are unpatentable over Dickson and Weaver.

(Office Action at 3-7.) Applicants respectfully disagree. In order for a reference or combination of references to form the basis for a rejection under § 103(a), the reference or combination of references must teach or suggest all of the elements of the claim. Because *Dickson* in view of *Weaver* fails to teach or suggest all of the elements of the present claims as currently amended, this combination does not obviate claims 1, 3-5, 10-14, 21, 24-29, 100-106, 111-127, 130-145, 147, and 149-151.

A. Dickson Does Not Disclose a Hydrophobically Modified Polymer Having a Molecular Weight in the Range of About 100,000 to about 10,000,000 Once Synthesized, as Recited by Independent Claims 1 and 127.

First, *Dickson* fails to teach or suggest a hydrophobically modified water-soluble polymer that "has a molecular weight in the range of about 100,000 to about 10,000,000 once synthesized," as recited in independent claims 1 and 127. In the Office Action, the Examiner states that "Dickson does not expressly disclose the molecular weight of the resultant branched polymers to be about 100,000 to about 10,000,000." (Office Action at 5.) However, *Dickson* teaches branched polyalkylene polyamines that have a molecular weight below the claimed range. *Dickson*, col. 2, line 16 to col. 3, line 5. For example, the branched polyalkylene polyamines of *Dickson* are expressed by the formulas in column 2. *Id.* In these formulas, the number of repeating units for the polyamine is limited to between 4 to 24, clearly indicating that the polyamines do not have the claimed molecular weight. *Dickson*, col. 2, line 16 to col. 3, line 5. To the extent that *Dickson* may teach increasing the molecular weight of these polymers, Applicants respectfully submit that *Dickson* does not disclose increasing the molecular weight of the disclosed polymers to achieve the claimed molecular weight of 100,000 to 10,000,000. Furthermore, even if *Dickson* disclosed increasing the molecular weight of the disclosed polymers to achieve the claimed molecular weight of 100,000 to 10,000,000, *Dickson* still would not teach the molecular weight of these polymers to be 100,000 to 10,000,000 ***once synthesized*** because, at most, *Dickson* only teaches increasing the molecular weight of polyamines by bridging two or more polyamine compounds after they are synthesized. *See Dickson*, col. 29, lines 13-18. As such, *Dickson* does not teach or suggest hydrophobically modified water-soluble polymers with molecular weights in the claimed range of about 100,000 to about 10,000,000 once synthesized.

B. Dickson Does Not Disclose Oxygen, Sulfur, or Phosphorous Within the Polymer Backbone, as Recited by Claims 4 and 131.

Second, *Dickson* fails to teach or suggest that "polar heteroatoms present within the polymer backbone of the hydrophobically modified water-soluble polymer comprise at least one atom selected from the group consisting of: oxygen, sulfur, and phosphorous," as recited in dependent claims 4 and 131. Rather, as clearly illustrated in the structures provided in column 2, *Dickson* at most teaches polymers comprising nitrogen in the backbone rather than oxygen, sulfur, or phosphorous. *Dickson*, col. 2, lines 15-65. As such, *Dickson* does not teach or suggest

hydrophobically modified water-soluble polymers with polar heteroatoms present within the polymer backbone comprising at least one atom selected from the group consisting of: oxygen, sulfur, and phosphorous.

C. Dickson Does Not Disclose a Hydrophobically Modified Polymer Comprising an Amino Pendant Group Quaternized to Include a Hydrophobic Branch, as Recited by Claims 106, 150, and 151.

Third, *Dickson* fails to teach or suggest a hydrophobically modified water-soluble polymer that comprises "an amino pendant group quaternized to include a hydrophobic branch," as recited in independent claim 106 and similarly recited in dependent claims 150 and 151. Rather, *Dickson* teaches branched polyalkylene polyamines that do not comprise a dialkyl amino pendant group quaternized to include a hydrophobic branch. *See Dickson*, col. 1, line 13 to line 50; col. 2, line 16 to col. 3, line 5. While the text and formulae depicted in col. 2, line 20-65 may demonstrate tertiary amino groups within the backbone of a polyamine, *Dickson* fails to disclose an amino pendant group ***quaternized*** to include the hydrophobic branch. Accordingly, the portions of *Dickson* cited by the Examiner do not disclose polymers that comprise a quaternized amino pendant group. As such, *Dickson* does not teach or suggest hydrophobically modified water-soluble polymers that comprise the claimed amino pendant group quaternized to include a hydrophobic branch.

D. Weaver Cannot Be Used to Cure the Deficiencies of Dickson.

As demonstrated above in Sections II(A)-(C), *Dickson* fails to teach or suggest all of the elements of independent claims 1, 106, and 127, and specific elements of dependent claims 4, 131, 150 and 151. Nor can *Weaver* be used to cure these deficiencies.

More particularly, *Weaver* cannot be used to cure the deficiencies of *Dickson* because *Weaver* does not teach a hydrophobically modified polymer that "reduces the permeability of the subterranean formation zone to aqueous-based fluids," as recited in independent claims 1, 106, and 127. As Applicants have stated in previous responses, *Weaver* fails to demonstrate a hydrophobically modified water-soluble polymer that reduces the permeability of the subterranean formation to aqueous-based fluids.

First, contrary to the Examiner's assertions, Tables 10-14 of the *Weaver* reference demonstrate a hydrophobically modified water-soluble polymer reducing the permeability of the subterranean formation to aqueous-based fluids. *See Weaver*, col. 57-60. For example, Sample

No. 7 in Table 10 of *Weaver* is not a hydrophobically modified polymer, in that it does not have a hydrophobic branch. *See Weaver*, col. 57. Rather, the Examiner has incorrectly referred to the methoxy-polyethylene glycol branch of Sample No. 7 as a hydrophobic branch. *See Weaver*, col. 57. Applicants respectfully submit that such branches are water-soluble, hydrophilic branches. As such Applicants maintain that Tables 10-14 of *Weaver* fail to demonstrate a **hydrophobically** modified water-soluble polymer that reduces the permeability of the subterranean formation to aqueous-based fluids, but rather these Tables demonstrate that permeability reduction can be achieved by utilizing polymers with **hydrophilic** branches. *See Weaver*, col. 57-60.

Second, as Applicants have also previously noted, *Weaver* teaches that branched polymers containing a hydrophobic modifying portion function to **increase** water permeability. *See Weaver*, col. 7, lines 43-52. In particular, Applicants direct the Examiner's attention to the table contained in columns 9 and 10 of *Weaver*. *See Weaver*, col. 9-10. As set forth in this table, *Weaver* teaches that branched polymers including a hydrophobic modifying portion increase water permeability. *See id.* As such, *Weaver* clearly does not teach utilizing a hydrophobically modified water-soluble polymer to reduce the permeability of the subterranean formation to aqueous-based fluids.

Therefore, if *Weaver* was combined with *Dickson* in the manner suggested by the Examiner, Applicants respectfully submit that this combination would not render obvious independent claims 1, 106, and 127, which require utilizing a hydrophobically modified polymer to reduce "the permeability of the subterranean formation zone to aqueous-based fluids." As such, *Weaver* cannot be used to cure deficiencies of *Dickson*.

E. Request Withdrawal of § 103(a) Rejection.

Therefore, Applicants respectfully assert that independent claims 1, 106, and 127 are not obvious over *Dickson* in view of *Weaver*. Moreover, claims 3-5, 10-14, 21, 24-29, 100-105, 111-126, 130-145, 147, and 149-151 depend, either directly or indirectly, from independent claims 1, 106, and 127. All these dependent claims include all the limitations of the independent claims from which they depend on, and thus are allowable for at least the reasons cited above with respect to independent claims 106 and 127. *See* 35 U.S.C. § 112 ¶ (2004). Furthermore, Applicants also assert that dependent claims 4, 131, 150, and 151 are also not obvious over *Dickson* in view of *Weaver* for the subject matter they individually recite. Applicants therefore request withdrawal of this rejection.

III. Remarks Regarding New Claims

Applicants respectfully submit that claims 155-157 are allowable. Claims 155-157 depend directly or indirectly from independent claims 1, 106, or 127, which Applicants have demonstrated are allowable above in Section II. These dependent claims contain all of the limitations of the independent claims they depend on, and thus are allowable for at least the same reasons. *See* 35 U.S.C. § 112 ¶ 4 (2004). Furthermore, Applicants respectfully submit that these dependent claims are also allowable for the specific elements they recite. Claims 155-157 require that the amino pendant group quaternized to include the hydrophobic branch "comprises a dialkyl amino pendant group." The portions of *Dickson* cited by the Examiner do not disclose polymers that comprise a quaternized dialkyl amino pendant group. The nitrogen atom in a dialkyl amino pendant group of a hydrophobically modified polymer quaternized to include a hydrophobic branch would be bonded to four carbon atoms (for example two of which may the carbon atoms from the alkyl groups, one of which may be the carbon atom from the side group off the polymer backbone to which the pendant group is bonded, and one of which may be the carbon atom from the hydrophobic branch). As such, *Dickson* does not teach or suggest hydrophobically modified water-soluble polymers that comprise the claimed dialkyl amino pendant group quaternized to include a hydrophobic branch. Furthermore, as discussed above in Section II (D), *Weaver* cannot be used to cure the deficiencies of *Dickson*. Therefore, Applicants respectfully submit that claims 155-157 are allowable. Applicants respectfully request the timely issuance of a Notice of Allowance for these claims.

IV. No Waiver

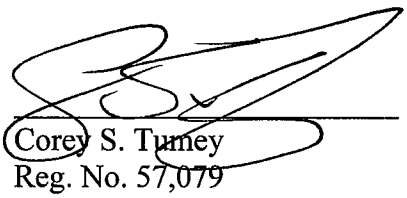
All of Applicants' arguments and amendments are without prejudice or disclaimer. Additionally, Applicants have merely discussed example distinctions from the cited references. Other distinctions may exist, and Applicants reserve the right to discuss these additional distinctions in a later Response or on Appeal, if appropriate. By not responding to additional statements made by the Examiner, Applicants do not acquiesce to the Examiner's additional statements, such as, for example, any statements relating to what would be obvious to a person of ordinary skill in the art.

SUMMARY

In light of the above remarks, Applicants respectfully request reconsideration and withdrawal of the outstanding rejections. Applicants further submit that the application is now in condition for allowance, and earnestly solicit timely notice of the same. Should the Examiner have any questions, comments, or suggestions in furtherance of the prosecution of this application, the Examiner is invited to contact the attorney of record by telephone, facsimile, or electronic mail.

Applicants believe that no fees are due at this time. Should the Commissioner deem that any fees are due, including any fees for extensions of time, Applicants respectfully request that the Commissioner accept this as a petition therefor, and direct that any fees be charged to the Deposit Account of Baker Botts L.L.P. (No. 02-0383, Order Number 063718.0331).

Respectfully submitted,



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